

**GENERAL REMARKS**

In response to Office Action (OA) mailed on 02/08/2005 and "Citation of prior art" mailed on 04/15/2005 applicant amends the claims in the above-identified application.

Complete listing of all claims with markings showing current changes is given on pages 3 to 9.

Pages 10 to 13 contain detailed remarks and closing statements.

DETAILED REMARKS

Office Action (OA) states: "Claims 1,2,5,8-10 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Ouyang '799. ... There are no special process steps recited in the specification which would enable any better placement than the MBE or CVD processes." Applicant would like to respectfully point out that the specification of the present invention does recite steps which enable a more precise placement of the metallurgical and heterojunction boundaries than achieved in the prior art. The steps of recessing source/drain regions in the body of the device, and then epitaxially depositing the new hetero-material in the hollowed out regions are the ones not found in the prior art, including the cited references of: Ouyang '799, Ouyang et al 10/00, and Oda '019.

Ouyang '799 uses CVD and MBE, indeed such techniques are decades old, but as it is commonly done, Ouyang '799 too uses these techniques to deposit planar layers only. Fig. 2a of Ouyang '799 and lines 8 -23 in column 3 describe these steps, which are quite routine. Ouyang '799 uses B and Ge ion implantations for creating the hetero and metallurgical junctions: column 3 lines 29 - 32 and Fig. 2b. With ion implantation, even if conditions are perfectly controlled, due to the statistical nature of ion stoppage in materials, there is the so called implant straggle, a sort of smudging of the implant boundary. This effect is also occurring at the edge, or side, of an implanted junction. Such implant straggle in the of best of cases is still several tens of nm-s. It is due to such lack of control with ion implantation, that the solution of in situ doped epitaxial deposition into recessed source/drain regions was necessary. Ouyang et al 10/00, Oda '019, Zhang '076, or Crawford '010 does not mention of epi deposition into recessed source/drain regions either. Applicant respectfully suggest that this approach, and the resulting structure are novel, useful and patentable.

In order to amplify and more fully express the full scope of the present invention

Serial No.: 10/698,122; Docket No.: YOR920030327US1

Page 10 of 13

applicant amended, as explained above, claims 1, 15, 19, and 38 to more particularly point out the nature of the source and drain of the claimed device.

These amendments render the present invention non-obvious, as well. OA states: "Claims 1-11,13-25,35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ouyang '799 in view of Ouyang et al 10/00 and Oda '019. ... Note also that O shows embodiments where the misalignment is less than 5nm (figure 12). These devices are prima facie obvious or anticipated." Applicant agrees that SOI as such is a known technology, however, it is not known in the context of the present devices as claimed in the amended claims. Applicant would like to point out that Ouyang et al 10/00 is a theoretical paper presenting simulations only. Figure 12 of Ouyang et al 10/00 explores current sensitivities as a function of hetero and metallurgical junction misalignment, from -20nm to +20nm. Hence, necessarily contains misalignments of less than 5nm. However, this work only shows the desirability of precise alignment, and there is not even a hint, less alone anticipation, on how to actualize the desired tight alignment. To realize the devices with the desirable attributes the present invention was necessary: depositing epitaxial hetero source/drain in the recessed regions of the original body's source and regions.

Applicant respectfully submits that if the amended independent claims 1, 19, and 38 are patentable, then all claims depending on these, which include further limitations, are a fortiori patentable. However, regarding claims 6 and 14 applicant has further remarks. Quoting the OA: "In Claim 6 is obvious as these orientations are standard in the art." Applicant would like to point out that the interesting transport properties re <110> crystal orientation is indeed standard for Si, it is not at all so for SiGe, and especially not for stressed SiGe. This <110> crystal orientation for stressed SiGe is a novel present day research topic. Regarding claim 14, the OA states: "Claims 1, 2, 5, 8, 14 and 38 are rejected. .... Claim 14 because the thickness of 34 is about an inversion layer." Applicant would like to point out that layer 34 of Ouyang '799 is

Serial No.: 10/698,122; Docket No.: YOR920030327US1

Page 11 of 13

not comparable to the "epitaxial Si cap layer" of claim 14, which is numbered 15 in Figs. 1A and 3D of the present disclosure. Layer 34 of Ouyang '799 corresponds to layer 30 in the present invention. In Ouyang '799 that part of layer 34 which is in the source/drain regions, becomes simply part of the SiGe source and drain following the Ge ion implantations. Layer 15 of the present invention, however, remains Si, as it is purposefully deposited on top of the SiGe layer to serve for better contact, see page 9 lines 1 -16 and page 16 lines 14 -18 of the specification. Accordingly, applicant submits that the fact that layer 34 of Ouyang '799 has the thickness of an inversion layer, does not anticipate the "epitaxial Si cap layer" of claim 14.

Applicant followed the OA instructions regarding claim 12: "Claim 12 is confusing because the source and drain region form a "top surface plane" and the recitation "raising above" is awkward. The structure of the top surface plane is also rather vague and indefinite. Claim 12 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims." Claim 12 was canceled and new claim 39 was added. New claim 39 has all the limitations of original claims 1 and 12, and the location of "top surface" as the plain of the gate dielectric (page 10 lines 3 -5) has been particularly pointed out. Accordingly, applicant believes that new claim 39 is now patentable.

Claims 26 -37 have been cancelled as per election of 12/07/2004. All other claims, not discussed so far, are original ones.

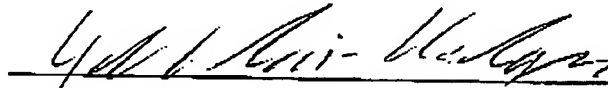
CLOSING STATEMENTS

Applicant respectfully submits that as expressed in this amendment the claims now put forward contains only patentable subject matter.

The Commissioner is hereby authorized to charge payment to Deposit Account No. 50-0510 for any charges that would be due for this amendment under 37 CFR 1.16 or 1.17, although applicant believes no such charges should be forthcoming.

Applicant submits that this application is now in condition for allowance, which action is respectfully requested.

Respectfully,



George Sai-Halasz, PhD  
Registration # 45,430

145 Fernwood Drive  
E. Greenwich, RI 02818.  
401-885-8032 (Fax 401-885-1046)  
E-MAIL - [patents@computer.org](mailto:patents@computer.org)

Cust. No.: **24299**